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(54) 【発明の名称】 バタフライ弁のシートリング

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(57) 【特許請求の範囲】

【請求項 1】円筒状の流体通路を貫設した剛性材料からなる弁本体と、該弁本体内に回動自在に軸支された剛性材料からなる円板状の弁体と、弁本体と弁体との間に介挿される弾性材料からなるシートリングとから構成され、シートリングの少なくとも一次側に対向する外周側面と内周面との間に斜面を形成し、該斜面と外周側面とがなす角度及び斜面の幅を、弁軸直交位置において最も大きくし、弁軸位置において最も小さくしたことを特徴とするバタフライ弁のシートリング。

【請求項 2】シートリングの両側面に斜面を形成し、両斜面の角度と幅を弁軸直交位置において最も大きくし、弁軸位置において最も小さくしたことを特徴とする請求項 1 記載のシートリング。

【請求項 3】斜面の幅と角度が最も大きな弁軸直交位置

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から最も幅と角度が小さい弁軸位置までの連続を、曲線で連続したことを特徴とする請求項 1 又は 2 記載のシートリング。

【請求項 4】曲線がコサインカーブであることを特徴とする請求項 3 記載のシートリング。

【請求項 5】斜面の幅と角度が最も大きな弁軸直交位置から最も幅と角度が小さい弁軸位置までの連続を、段部で連続したことを特徴とする請求項 1 又は 2 記載のシートリング。

10 【請求項 6】斜面の幅と角度が最も大きな弁軸直交位置から最も幅と角度が小さい弁軸位置までの連続を、直線で連続したことを特徴とする請求項 1 又は 2 記載のシートリング。

【請求項 7】シートリングの内周面に、内径方向に突出する山形のシート部を形成したことを特徴とする請求項

1乃至6のいずれかに記載のシートリング。

【請求項8】山形のシート部の幅が、弁軸直交位置に於いて最も大きく形成されていることを特徴とする請求項7記載のシートリング。

【請求項9】シートリングの内周面が平坦であることを特徴とする請求項1乃至6のいずれかに記載のシートリング。

【請求項10】シートリングの内部に金属製補強板が埋め込まれていることを特徴とする請求項1乃至9のいずれかに記載のシートリング。

【請求項11】シートリングの両側面に弁本体に係合するフランジ部が形成されていることを特徴とする請求項1乃至9のいずれかに記載のシートリング。

【請求項12】シートリングが、ゴム、合成樹脂等のエラストマーで形成されていることを特徴とする請求項1乃至11のいずれかに記載のシートリング。

【請求項13】シートリングが、ポリテトラフルオロエチレンで形成されていることを特徴とする請求項1乃至11のいずれかに記載のシートリング。

【発明の詳細な説明】

【0001】

【発明の属する分野】この発明は、バタフライ弁のシートリングに関し、特に高圧流体の仕様条件下でシートリングの変形量の削減を図ると共に、配管時の変形を防止するようにしたバタフライ弁のシートリングに関する。

【0002】

【従来の技術】従来、バイブラインの開閉を行うために、配管パイプのフランジ間に挟み込んでバイブラインに配管するようにしたウェハータイプのバタフライ弁は、公知であり汎用されている。一般的に中心形のバタフライ弁は、円筒状の流路を貫設した金属等の剛性材料からなる弁本体と、該弁本体内部に弁軸と弁体の中心を合致させて回転自在に軸支した剛性材料からなる円板状の弁体と、弁体内周面に装着された弾性材料からなるシートリングとから構成され、弁体の回転によって弁体外周面をシートリングに接離させて、弁体内の円筒状の流路を開閉するようになっている。

【0003】バタフライ弁のシートリングは、弾性材料からなり閉弁時に弁体の外周面をシートリングに圧接させて喰い込ませ、シール性を確保する構造であるため、閉弁時にシートリングと弁体との圧接によって大きな反発力が発生し、弁体の回転トルクが大きくなる問題があった。かかる回転トルクは、弁体とシートリングとの引きずりによってもたらされるものであり、弁軸周囲において最も大きくなり弁軸と直交する位置において最も小さくなっている。そこで、シートリングの中心部に内径方向に突出する山形のシート部を形成するとともに、この山形のシート部の幅を弁軸と直交する位置で最も大きくし、弁軸に近づくにしたがって小さくなるようにしたシートリングの構造を、先に本出願人は特許第1197

350号（特公昭58-25911号公報）で提案した。これにより、弁体の回転トルクの軽減とシール性の確保とを高いレベルで達成することが可能となった。

【0004】しかしながら、弁体を閉弁方向又は開弁方向に回転して微少開度の状態になると、弁体の一次側すなわちオリフィス側において流速が上昇し、内径方向への吸引力が発生し、シートリングは内径方向に引き出される。かかる吸引力は、弁軸と直交する位置で最も大きくなり、又仕様条件が高圧流体であるほど大きくなる。このため、シートリングはその一部が破損されたり、弁本体内部から引き剥がされることとなり、弁の寿命を短くしている。

【0005】

【発明が解決しようとする課題】この発明は、微少開度時に弁体のオリフィス側に発生する流速の上昇に伴う内径方向への吸引力によって、シートリングが損傷されたり剥離されるのを防止することを課題とする。

【0006】

【課題を解決するための手段】上記課題を解決するためにこの発明が採った手段は、円筒状の流体通路を貫設した剛性材料からなる弁本体と、該弁本体内部に回転自在に軸支された剛性材料からなる円板状の弁体と、弁本体と弁体との間に介挿される弾性材料からなるシートリングとから構成され、シートリングの少なくとも一次側に対向する外周側面と内周面との間に斜面を形成し、該斜面と外周側面とがなす角度及び斜面の幅を、弁軸直交位置において最も大きくし、弁軸位置において最も小さくしたことを特徴とする。角度と幅を弁軸直交位置において最も大きくし、弁軸位置において最も小さくした斜面は、シートリングの両側面に形成しても良い。

【0007】斜面の幅と角度が最も大きな弁軸直交位置から最も幅と角度が小さい弁軸位置までの連続は、コサインカーブ等の曲線、段部或は直線で連続したことを特徴とする。

【0008】シートリングの内周面は、内径方向に突出する山形のシート部が形成され、該山形のシート部はその幅が、弁軸直交位置に置いて最も大きく形成されていることを特徴とする。

【0009】シートリングの内周面が平坦であることを特徴とする。

【0010】シートリングの内部に金属製補強板が埋め込まれていることを特徴とする。

【0011】シートリングの両側面に弁本体に係合するフランジ部が形成されていることを特徴とする。

【0012】シートリングが、ゴム、合成樹脂等のエラストマー、或はポリテトラフルオロエチレンで形成されていることを特徴とする。

【0013】

【発明の実施の形態】この発明の好ましい実施の形態を、以下に詳細に説明する。この発明は、中心形バタフ

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ライ弁のシートリングにおいて、シートリングの内周面と外周側面との間に形成される斜面の幅(L)と、外周側面と斜面とがなす角度(θ)とを、弁軸孔と直交する位置から弁軸孔位置に向かって変化させたことを特徴とする。すなわち、シートリングの斜面の幅(L)及び角度(θ)を、弁軸直交位置において最大とし、弁軸孔位置で最小とする。斜面の最大位置と最小位置との間は、曲線、直線或は段状の連続のいずれの連続構造としても良い。又、斜面は、少なくとも弁の一次側と対向する面に形成することが必要であるが、配管への施工時の左右勝手をなくすために両側に形成しても良い。この発明を適用可能なシートリングは、内周面に山形の突起を形成したもの、山形の突起のないフラットな形状のもの、或は内部に補強用の金属板を埋め込んだもの、そのような補強金属板のないもの、更には両側に取付用のフランジを接続したもの、そのようなフランジのないもの等、いずれの構造であっても良く、シートリングの構造は特に限定されない。又、シートリングの材質は、ゴム、合成樹脂或はその他の弾性材料等のいずれの弾性材料であっても良く、更に材料自体には弾性がないが他の材料或は構造と組み合わせることによって、実質的に弾性を発揮するようなシートリングも含まれる。

【0014】バタフライ弁の弁体を閉弁方向又は開弁方向に回転して、弁体のオリフィス側において弁体が微少開度となったとき、図1に示すように従来のバタフライ弁は、弁体の先端とシートリングの内周面との間が微少の隙間となるため、この隙間から流体が急速な流れとなって二次側に流出する。オリフィス側におけるかかる流体の急速な流れは、シートリングの内周面に吸引力を作用しシートリングを内径方向に吸引してシートリングを損傷したり、弁本体から引き剥がしてしまう。この発明のシートリングは、かかるオリフィス側において最も吸引力が強く作用する弁軸直交位置の斜面の幅(L)と角度(θ)を前述したように最も大きくしてあるので、微少開度における弁体先端とシートリング内周面との間の隙間が十分に広くなり、図3に示すように内方に吸引されるシートリングの量を可能な限り減少させることが出来、シートリングの損傷や弁本体からの剥離現象を防止することが可能となる。図2は、斜面の幅と角度がいまだ十分な大きさを有していない場合を示し、この場合にはシートリングの吸引量は図1のものとほとんど変化がないため、損傷や剥離を効果的に防止することは出来なかった。尚、図1、2、3において点線はシートリングの吸引の大きさを表している。

【0015】

【実施例】図4～10を参照して、この発明の好ましい実施例を説明する。図4、5を参照して、(1)はバタフライ弁の弁本体であって、金属、硬質の合成樹脂等の剛性材料から構成され、内部に円筒形状の流体通路(2)が貫設されている。流体通路(2)内には円板状の弁体(3)

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が弁軸と回転中心と合致させて回転自在に軸支される。(4)は、流体通路(2)の内周面に装着されるゴム、合成樹脂等の弾性材料からなるシートリングであり、弁体(3)の外周面と接離して流体通路(2)の開閉を行う。図6を参照して、シートリング(4)の内周面中央には従来公知のシートリングと同様に、内径方向に突出した山形のシート部(5)が内周面を圍繞して形成されている。該山形シート部(5)は、シートリング(4)を直径方向に貫通する弁軸孔(6)と直交する位置においてその幅が最も大きく形成され、弁軸孔(6)に近づくにしたがって漸次幅が減少し、弁軸孔のボス部(7)の外周縁に隣接する位置で最も小さくなっている。図示のシートリング(4)は高圧流体仕様のものであり、内部に帯金状の金属製補強板(8)が埋め込まれている。シートリング(4)の内周面(9)と外周側面(10)の間には斜面(11)が形成される。

【0016】斜面(11)は、シートリング(4)の両側面に形成されているが、図7～10に示すように弁の一次側に位置する斜面(11)はその幅(L)と角度(θ)が、弁軸と直交する位置(C-C'断面位置)においては、最大の幅(L2)と角度(θ 2)に形成され、弁軸孔位置(A-A'断面位置)では最小の幅(L1)と角度(θ 1)に形成されており、途中の位置(B-B'断面位置)では弁軸孔位置と同一の幅(L1)と角度(θ 1)に形成され、C-C'断面位置からB-B'断面位置の間は滑らかな曲線(12)で連続され、B-B'位置からA-A'位置まではほぼ直線で連続されている。二次側に位置する斜面の幅と角度は、その全ての部分において一次側斜面のA-A'断面位置の最小の幅(L1)、角度(θ 1)と同一に形成される。曲線(12)は、円弧線に限定されるものではなく、コサインカーブのような曲線であっても良い。

【0017】斜面(11)の最大の幅と角度を有するC-C'断面位置から最小の幅と角度を有するA-A'断面位置の間の連続は、図7に示す滑らかな曲線(12)による連続に限られるものではなく、図11に示すように段部(13)により連続しても良く、図12に示すように直線(14)で連続しても良い。段部(13)で連続する場合、図11に示すようにB-B'断面位置とするのが好ましいが、これに限定されるものではない。又、図14、15に示すように、一次側のみならず二次側の斜面(11)の幅(L)と角度(θ)も、一次側と同じように変化させても良い。このように両側の斜面の幅と角度を変化させることにより、バタフライ弁を図5に示すように配管パイプ(15)のフランジ(16)間に挟み込んで取り付けるときに、弁に左右の勝手違いがなくなり施工ミスを防止するのに有益となる。

【0018】シートリング(4)は、前述した高圧流体仕様の構造に限られないことは勿論であり、図16～18に示す比較的低圧の流体に多用されている構造のシートリング(40)にも全く同様に適用することが出来る。すな

わち低圧用のシートリング(40)は、基本的にエラストマーのみから構成され補強用の金属板の埋め込みはなく、両側には弁本体の外周側面に係入するフランジ部(41)が形成された構造が最も一般的である。このようなシートリングにおいても、前記した斜面の幅及び角度を全く同様に適用可能である。又、シートリングの内周面は図示の山形シート部を備えたものに限られないことは勿論であり、フラットな内周面を有するシートリング、或はその他の形状、構造を有する内周面であっても良い。更に、シートリングの材質はゴム、合成樹脂等のエラストマーに限られず、ポリテトラフルオロエチレンのような弾性のきわめて少ない樹脂からなるシートリングにも同様に適用することが出来る。

【0019】

【発明の効果】この発明によれば、閉弁又は閉弁時の微小開度におけるオリフィス側での急速な流体からもたらされる吸引力でシートリングが損傷されたり、或は弁本体から剥離されたりする問題を解消することが出来る。

【図面の簡単な説明】

【図1】従来のバタフライ弁のオリフィス側におけるシートリングの吸引状態を示す説明図

【図2】不十分な幅と角度を有する斜面を備えたシートリングの吸引状態を示す説明図

【図3】この発明にかかる斜面を備えたシートリングの吸引状態を示す説明図

【図4】この発明にかかるシートリングを組み込んだバタフライ弁の一部を断面した斜視図

【図5】この発明にかかるシートリングを備えたバタフライ弁を配管ラインに施工した状態を示す断面図

【図6】この発明にかかるシートリングの一部を断面した斜視図

【図7】この発明にかかるシートリングの展開図

*【図8】図7A-A'線に沿った断面図

【図9】図7B-B'線に沿った断面図

【図10】図7C-C'線に沿った断面図

【図11】この発明にかかるシートリングの一変形の展開図

【図12】他の一変形の展開図

【図13】更に他の変形の展開図

【図14】図13B-B'線に沿った断面図

【図15】図13C-C'線に沿った断面図

10 【図16】更に他の変形のシートリングを図7A-A'線位置で断面した図

【図17】同、図7B-B'線位置で断面した図

【図18】同、図7C-C'線位置で断面した図

【符号の説明】

(1)弁本体

(2)流体通路

(3)弁体

(4)シートリング

(5)山形シート部

(6)弁軸孔

(7)ボス部

(8)金属製補強板

(9)内周面

(10)外周側面

(11)斜面

(12)曲線

(13)段部

(14)直線

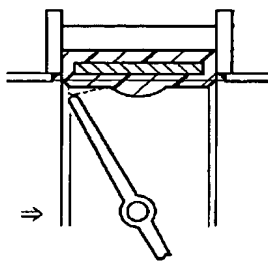
(40)シートリング

(41)フランジ部

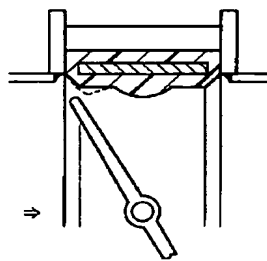
(L)斜面の幅

(θ)斜面の角度

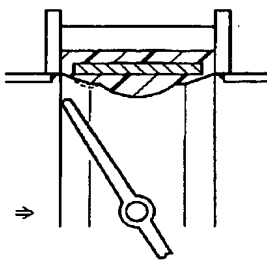
【図1】



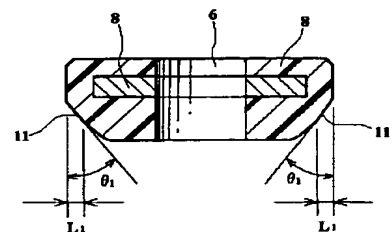
【図2】



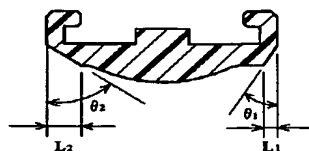
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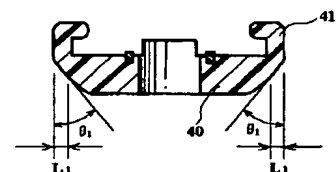
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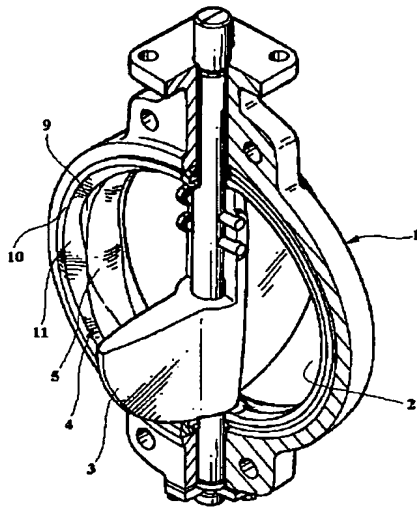
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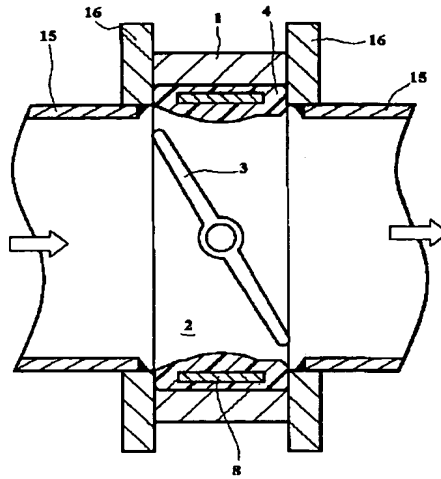
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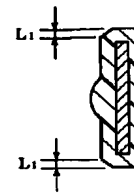
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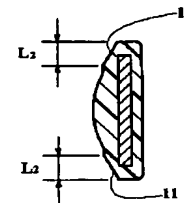
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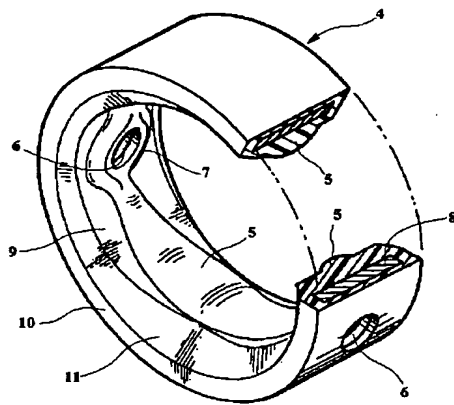
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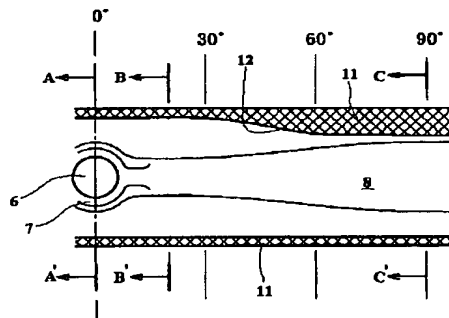
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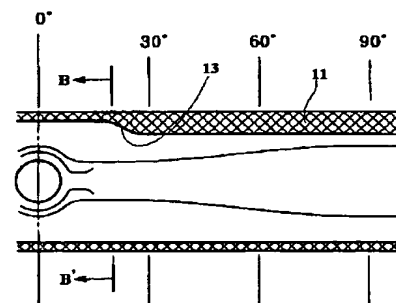
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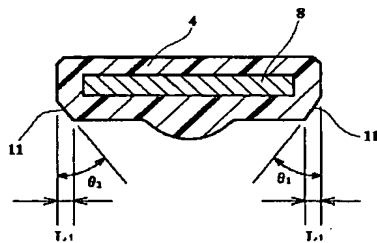
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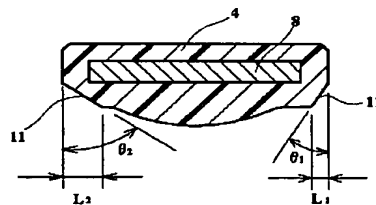
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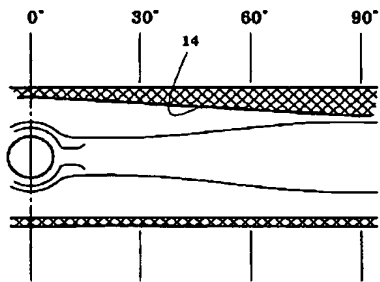
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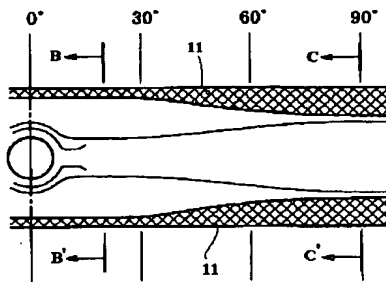
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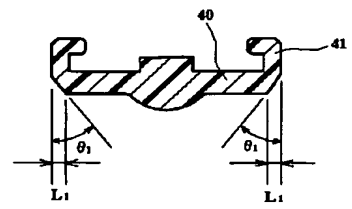
【図12】



【図13】



【図17】



フロントページの続き

(58)調査した分野(Int.Cl.⁷, DB名)

F16K 1/226

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CLAIMS

(57) [Claim(s)]

[Claim 1] The valve body which consists of a rigid ingredient which installed the cylinder-like fluid channel, and the disc-like valve element which consists of a rigid ingredient supported to revolve free [rotation in this valve body], It consists of seat rings which consist of a spring material inserted between a valve body and a valve element. The seat ring of the butterfly valve characterized by having formed the slant face between the periphery side faces and inner skin of a seat ring which counter the upstream at least, having enlarged most the include angle which this slant face and a periphery side face make, and width of face of a slant face in the valve-stem rectangular cross location, and making it the smallest in a valve-stem location.

[Claim 2] The seat ring according to claim 1 characterized by having formed the slant face in the both-sides side of a seat ring, having enlarged most the include angle and width of face of both slant faces in the valve-stem rectangular cross location, and making it the smallest in a valve-stem location.

[Claim 3] The seat ring according to claim 1 or 2 characterized by continuing with a curve continuation from the valve-stem rectangular cross location where the width of face and the include angle of a slant face are the biggest to the valve-stem location where width of face and an include angle are the smallest.

[Claim 4] The seat ring according to claim 3 characterized by a curve being a cosine curve.

[Claim 5] The seat ring according to claim 1 or 2 characterized by continuing continuation from the valve-stem rectangular cross location where the width of face and the include angle of a slant face are the biggest to the valve-stem location where width of face and an include angle are the smallest by the step.

[Claim 6] The seat ring according to claim 1 or 2 characterized by continuing continuation from the valve-stem rectangular cross location where the width of face and the include angle of a slant face are the biggest to the valve-stem location where width of face and an include angle are the smallest in a straight line.

[Claim 7] The seat ring according to claim 1 to 6 characterized by forming the sheet section of Yamagata which projects in the bore direction in the inner skin of a seat ring.

[Claim 8] The seat ring according to claim 7 to which width of face of the sheet section of Yamagata is characterized by being most greatly formed in a valve-stem rectangular cross location.

[Claim 9] The seat ring according to claim 1 to 6 characterized by the inner skin of a seat ring being flat.

[Claim 10] The seat ring according to claim 1 to 9 characterized by embedding the metal back up plate to the interior of a seat ring.

[Claim 11] The seat ring according to claim 1 to 9 characterized by forming in the both-sides side of a seat ring the flange which engages with a valve body.

[Claim 12] The seat ring according to claim 1 to 11 to which a seat ring is characterized by being formed by elastomers, such as rubber and synthetic resin.

[Claim 13] The seat ring according to claim 1 to 11 to which a seat ring is characterized by being formed by polytetrafluoroethylene.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] Especially this invention relates to the seat ring of a butterfly valve which prevented the deformation at the time of piping while aiming at the cutback of the deformation of a seat ring under the specification conditions of a high voltage fluid about the seat ring of a butterfly valve.

[0002]

[Description of the Prior Art] In order to perform a pipeline's closing motion conventionally, the butterfly valve of the wafer type puts between the flanges of a piping pipe and it was made to pipe a pipeline is well-known, and is used widely. The valve body with which the butterfly valve of a main form generally consists of rigid ingredients, such as a metal which installed cylinder-like passage, The disc-like valve element which consists of a rigid ingredient which the core of a valve stem and a valve element was made to agree, and was supported to revolve free [rotation] in this valve body, It consists of seat rings which consist of a spring material with which valve body inner skin was equipped, and by rotation of a valve element, a valve element peripheral face is made to attach and detach to a seat ring, and the passage of the shape of a cylinder within a valve body is opened and closed.

[0003] The seat ring of a butterfly valve consists of a spring material, carries out the pressure welding of the peripheral face of a valve element to a seat ring at the time of clausilium, was made to consume, and since it was the structure of securing seal nature, big repulsive force occurred with the pressure welding of a seat ring and a valve element at the time of clausilium, and it had the problem to which the rotation torque of a valve element becomes large. This rotation torque is brought about by the drag of a valve element and a seat ring, and is the smallest in the location which becomes the largest in a valve stem perimeter and intersects perpendicularly with a valve stem. Then, while forming in the core of a seat ring the sheet section of Yamagata which projects in the bore direction, width of face of the sheet section of this Yamagata was made the largest in the location which intersects perpendicularly with a valve stem, and these people proposed previously the structure of a seat ring it was made to become small at a valve stem according to ***** by patent No. (JP,58-25911,B) 1197350. This became possible to attain relief of the rotation torque of a valve element, and reservation of seal nature on high level.

[0004] However, if a valve element is rotated in the direction of clausilium, or the direction of clausilium and it will be in the condition of a very small opening, the rate of flow will go up to the upstream, i.e., orifice, side of a valve element, the suction force to the bore direction will occur, and a seat ring will be pulled out in the bore direction. This suction force becomes the largest in the location which intersects perpendicularly with a valve stem, and becomes so large that specification conditions are high voltage fluids. For this reason, that part will be damaged, or a seat ring will be torn off from valve body inner skin, and shortens the life of a valve.

[0005]

[Problem(s) to be Solved by the Invention] With the suction force to the bore direction accompanying lifting of the rate of flow generated in the orifice side of a valve element at the time of a very small opening, a seat ring is damaged or this invention makes it a technical problem to prevent exfoliating.

[0006]

[Means for Solving the Problem] The means which this invention took in order to solve the above-mentioned technical problem The valve body which consists of a rigid ingredient which installed the cylinder-like fluid channel, and the disc-like valve element which consists of a rigid ingredient supported to revolve free [rotation in this valve body], It consists of seat rings which consist of a spring material inserted between a valve body and a valve element. It is characterized by having formed the slant face between the periphery side faces and inner skin of a seat ring which counter the upstream at least, having enlarged most the include angle which this slant face and a periphery side face make, and width of face of a slant face in the valve-stem rectangular cross location, and making it the smallest in a valve-stem location. The slant face which enlarged an include angle and width of face most in the valve-stem rectangular cross location, and was made the smallest in the valve-stem location may be formed in the both-sides side of a seat ring.

[0007] Continuation from the valve-stem rectangular cross location where the width of face and the include angle of a slant face are the biggest to the valve-stem location where width of face and an include angle are the smallest is characterized by continuing in a curve, a step, or straight lines, such as a cosine curve.

[0008] It is characterized by forming the sheet section of Yamagata where the inner skin of a seat ring projects in the bore direction, and for the width of face putting the sheet section of this Yamagata on a valve-stem rectangular cross location, and being formed most greatly.

[0009] It is characterized by the inner skin of a seat ring being flat.

[0010] It is characterized by embedding the metal back up plate to the interior of a seat ring.

[0011] It is characterized by forming in the both-sides side of a seat ring the flange which engages with a valve body.

[0012] A seat ring is characterized by being formed by elastomers, such as rubber and synthetic resin, or polytetrafluoroethylene.

[0013]

[Embodiment of the Invention] The gestalt of desirable implementation of this invention is explained below at a detail. This invention is characterized by changing the include angle (θ) which the width of face (L) of the slant face formed between the inner skin of a seat ring and a periphery side face, and a periphery side face and a slant face make toward a valve boss location from the location which intersects perpendicularly with a valve boss in the seat ring of a main form butterfly valve. That is, the width of face (L) and the include angle (θ) of a slant face of a seat ring are made into max in a valve-stem rectangular cross location, and are made into min in a valve boss location. Between the maximum location of a slant face, and the minimum location, it is good also as which continuation structure of continuation of the shape of a curve, a straight line, or a stage. Moreover, although a slant face needs to form in the upstream of a valve, and the field which counters at least, in order to lose the right-and-left kitchen at the time of the construction to piping, it may be formed in both sides. The seat rings which can apply this invention may be which structures, such as a thing of what formed the projection of Yamagata in inner skin, and a flat configuration without the projection of Yamagata or a thing which embedded the metal plate for reinforcement inside, a thing without such a reinforcement metal plate, a thing which connected [both sides] the flange for mounting further, and a thing without such a flange, and especially the structure of a seat ring is not limited. Moreover, the construction material of a seat ring may be which spring materials, such as rubber, synthetic resin, or other spring materials, and although there is no elasticity in the ingredient itself further, a seat ring which demonstrates elasticity substantially is also contained by combining with other ingredients or structure.

[0014] When the valve element of a butterfly valve is rotated in the direction of clausilium, or the valve-opening direction and a valve element becomes a very small opening at the orifice side of a valve element, as shown in drawing 1, since between the head of a valve element and the inner skin of a seat ring turns into a very small clearance, a fluid serves as rapid flow from this clearance, and the conventional butterfly valve flows into secondary. The rapid flow of this fluid by the side of an orifice acts a suction force on the inner skin of a seat ring, attracts a seat ring in the bore direction, and a seat ring will be damaged or it will tear it off from a valve body. Since the seat ring of this invention is most enlarged as the width of face (L) and the include angle (θ) of a slant face of the valve-stem rectangular cross location where a suction force acts on this orifice side strongly most were mentioned above. The clearance between the valve element heads and seat ring inner skin in a very small opening becomes large enough, as shown in drawing 3, the amount of the seat ring attracted by the method of inside can be decreased as much as possible, and it becomes possible to prevent the exfoliation phenomenon from breakage and the valve body of a seat ring. Drawing 2 showed the case where the width of face and the include angle of a slant face did not have still sufficient magnitude, and in this case, since the amount of attraction of a seat ring was almost changeless with the thing of drawing 1, it was able to prevent neither breakage nor exfoliation effectively. In addition, in drawing 1, and 2 and 3, the dotted line expresses the magnitude of attraction of a seat ring.

[0015]

[Example] The desirable example of this invention is explained with reference to drawing 4 -10. With reference to drawing 4 and 5, (1) is the valve body of a butterfly valve, it consists of rigid ingredients, such as a metal and hard synthetic resin, and the cylindrical shape-like fluid channel (2) is installed through the interior. In a fluid channel (2), a disc-like valve element (3) makes it agree with a valve stem and a rotation core, and is supported to revolve free [rotation]. (4) is a seat ring which consists of spring materials with which the inner skin of a fluid channel (2) is equipped, such as rubber and synthetic resin, attaches and detaches the peripheral face of a valve element (3), and opens and closes a fluid channel (2). With reference to drawing 6, conventionally like the well-known seat ring, the sheet section (5) of Yamagata which projected in the bore direction surrounds inner skin in the center of inner skin of a seat ring (4), and is formed in it. In the location which intersects perpendicularly with the valve boss (6) which penetrates a seat ring (4) in the diameter direction, the width of face is formed most greatly, width of face decreases gradually according to ***** to a valve boss (6), and this Yamagata sheet section (5) is the smallest in the location contiguous to the periphery edge of the boss section (7) of a valve boss. The seat ring (4) of a graphic display is the thing of a high voltage fluid service, and the band-like metal back up plate (8) is embedded inside. A slant face (11) is formed between the inner skin (9) of a seat ring (4), and a periphery side face (10).

[0016] Although the slant face (11) is formed in the both-sides side of a seat ring (4) In the location (C-C' cross-section location) where, as for the slant face (11) located in the upstream of a valve as shown in drawing 7 -10, a valve stem, and the width of face (L) and include angle (θ) cross at right angles It is formed in the maximum width of face (L2) and the maximum include angle (θ 2), and is formed in the minimum width of face (L1) and the minimum include angle (θ 1) in the valve boss location (A-A' cross-section location). In the intermediate location (B-B' cross-section location), it is formed in the same width of face (L1) and the same include angle (θ 1) as a valve boss location, and it continues by the smooth curve (12) between C-C'B-B from cross-section location' cross-section locations, and it is continuing in a straight line mostly up to the B-B'A-A from location' location. The width of face and the include angle of a slant face which are located in secondary are formed in all those parts identically to the minimum width of face (L1) of the A-A' cross-section location of an upstream slant face, and an include angle (θ 1). A curve (12) may not be limited to a radii line and may be a curve like a cosine curve.

[0017] The continuation between the C-C'A-A which has minimum width-of-face and minimum include angle from cross-section location' cross-section locations which have the maximum width of face and the maximum include angle of a slant face (11) is not restricted to continuation by the smooth curve (12) shown in drawing 7, as shown in drawing 11, it may continue by the step (13), and as shown in drawing 12, it may continue in a straight line (14). Although considering as a B-B' cross-section location is desirable as shown in drawing 11 when continuing by the step (13), it is not limited to this. Moreover, you may make it change like [not only the upstream but the secondary width of face (L) and the secondary include angle (θ) of a slant face (11)] the upstream, as shown in drawing 14 and 15. Thus, as shown in drawing 5, when putting and attaching a butterfly valve between the flanges (16) of a piping pipe (15) by changing the width of face and the include angle of a slant face of both sides, it becomes useful the selfish difference in right and left being lost to a valve, and preventing a construction mistake.

[0018] The seat ring (4) of not being restricted to the structure of a high voltage fluid service mentioned above is natural, and can completely be similarly applied to the seat ring (40) of the structure currently used abundantly at the comparatively low-pressure fluid shown in drawing 16 -18. That is, the seat ring for low voltage (40) consists of only elastomers fundamentally, the

embedding of the metal plate for reinforcement does not have it, and its structure where the ring (41) inserted into the periphery side face of a valve body was formed is the most common on both sides. In such a seat ring, the above mentioned width of face and the above mentioned include angle of a slant face are completely applicable similarly. Moreover, the inner skin of a seat ring of not being restricted to the thing equipped with the Yamagata sheet section of a graphic display may be natural, and may be inner skin which has the seat ring which has flat inner skin or other configurations, and structure. Furthermore, the construction material of a seat ring is not restricted to elastomers, such as rubber and synthetic resin, but can be applied also like the seat ring which consists of very little resin of elasticity like polytetrafluoroethylene.

[0019]

[Effect of the Invention] According to this invention, the problem which a seat ring is damaged in the suction force brought about from the rapid fluid by the side of the orifice in the very small opening at the time of clausilium or clausilium, or exfoliates from a valve body is solvable.

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TECHNICAL FIELD

[Field of the Invention] Especially this invention relates to the seat ring of a butterfly valve which prevented the deformation at the time of piping while aiming at the cutback of the deformation of a seat ring under the specification conditions of a high voltage fluid about the seat ring of a butterfly valve.

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PRIOR ART

[Description of the Prior Art] In order to perform a pipeline's closing motion conventionally, the butterfly valve of the wafer type puts between the flanges of a piping pipe and it was made to pipe a pipeline is well-known, and is used widely. Generally the butterfly valve of a main form is a valve body which consists of rigid ingredients, such as a metal which installed cylinder-like passage. It consists of a disc-like valve element which consists of a rigid ingredient which the core of a valve stem and a valve element was made to agree, and was supported to revolve free [rotation] in this valve body, and a seat ring which consists of a spring material with which valve body inner skin was equipped, and by rotation of a valve element, a valve element peripheral face is made to attach and detach to a seat ring, and the passage of the shape of a cylinder within a valve body is opened and closed.

[0003] The seat ring of a butterfly valve consists of a spring material, carries out the pressure welding of the peripheral face of a valve element to a seat ring at the time of clausilium, was made to consume, and since it was the structure of securing seal nature, big repulsive force occurred with the pressure welding of a seat ring and a valve element at the time of clausilium, and it had the problem to which the rotation torque of a valve element becomes large. This rotation torque is brought about by the drag of a valve element and a seat ring, and is the smallest in the location which becomes the largest in a valve stem perimeter and intersects perpendicularly with a valve stem. Then, while forming in the core of a seat ring the sheet section of Yamagata which projects in the bore direction, width of face of the sheet section of this Yamagata was made the largest in the location which intersects perpendicularly with a valve stem, and these people proposed previously the structure of a seat ring it was made to become small at a valve stem according to ***** by patent No. (JP,58-25911,B) 1197350. This became possible to attain relief of the rotation torque of a valve element, and reservation of seal nature on high level.

[0004] However, if a valve element is rotated in the direction of clausilium, or the direction of clausilium and it will be in the condition of a very small opening, the rate of flow will go up to the upstream, i.e., orifice, side of a valve element, the suction force to the bore direction will occur, and a seat ring will be pulled out in the bore direction. This suction force becomes the largest in the location which intersects perpendicularly with a valve stem, and becomes so large that specification conditions are high voltage fluids. For this reason, that part will be damaged, or a seat ring will be torn off from valve body inner skin, and shortens the life of a valve.

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EFFECT OF THE INVENTION

[Effect of the Invention] According to this invention, the problem which a seat ring is damaged in the suction force brought about from the rapid fluid by the side of the orifice in the very small opening at the time of clausilium or clausilium, or exfoliates from a valve body is solvable.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] With the suction force to the bore direction accompanying lifting of the rate of flow generated in the orifice side of a valve element at the time of a very small opening, a seat ring is damaged or this invention makes it a technical problem to prevent exfoliating.

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MEANS

[Means for Solving the Problem] The means which this invention took in order to solve the above-mentioned technical problem The valve body which consists of a rigid ingredient which installed the cylinder-like fluid channel, and the disc-like valve element which consists of a rigid ingredient supported to revolve free [rotation in this valve body], It consists of seat rings which consist of a spring material inserted between a valve body and a valve element. It is characterized by having formed the slant face between the periphery side faces and inner skin of a seat ring which counter the upstream at least, having enlarged most the include angle which this slant face and a periphery side face make, and width of face of a slant face in the valve-stem rectangular cross location, and making it the smallest in a valve-stem location. The slant face which enlarged an include angle and width of face most in the valve-stem rectangular cross location, and was made the smallest in the valve-stem location may be formed in the both-sides side of a seat ring.

[0007] Continuation from the valve-stem rectangular cross location where the width of face and the include angle of a slant face are the biggest to the valve-stem location where width of face and an include angle are the smallest is characterized by continuing in a curve, a step, or straight lines, such as a cosine curve.

[0008] It is characterized by forming the sheet section of Yamagata where the inner skin of a seat ring projects in the bore direction, and for the width of face putting the sheet section of this Yamagata on a valve-stem rectangular cross location, and being formed most greatly.

[0009] It is characterized by the inner skin of a seat ring being flat.

[0010] It is characterized by embedding the metal back up plate to the interior of a seat ring.

[0011] It is characterized by forming in the both-sides side of a seat ring the flange which engages with a valve body.

[0012] A seat ring is characterized by being formed by elastomers, such as rubber and synthetic resin, or polytetrafluoroethylene.

[0013]

[Embodiment of the Invention] The gestalt of desirable implementation of this invention is explained below at a detail. This invention is characterized by changing the include angle (θ) which the width of face (L) of the slant face formed between the inner skin of a seat ring and a periphery side face, and a periphery side face and a slant face make toward a valve boss location from the location which intersects perpendicularly with a valve boss in the seat ring of a main form butterfly valve. That is, the width of face (L) and the include angle (θ) of a slant face of a seat ring are made into max in a valve-stem rectangular cross location, and are made into min in a valve boss location. Between the maximum location of a slant face, and the minimum location, it is good also as which continuation structure of continuation of the shape of a curve, a straight line, or a stage. Moreover, although a slant face needs to form in the upstream of a valve, and the field which counters at least, in order to lose the right-and-left kitchen at the time of the construction to piping, it may be formed in both sides. The seat rings which can apply this invention may be which structures, such as a thing of what formed the projection of Yamagata in inner skin, and a flat configuration without the projection of Yamagata or a thing which embedded the metal plate for reinforcement inside, a thing without such a reinforcement metal plate, a thing which connected [both sides] the flange for mounting further, and a thing without such a flange, and especially the structure of a seat ring is not limited. Moreover, the construction material of a seat ring may be which spring materials, such as rubber, synthetic resin, or other spring materials, and although there is no elasticity in the ingredient itself further, a seat ring which demonstrates elasticity substantially is also contained by combining with other ingredients or structure.

[0014] When the valve element of a butterfly valve is rotated in the direction of clausilium, or the valve-opening direction and a valve element becomes a very small opening at the orifice side of a valve element, as shown in drawing 1, since between the head of a valve element and the inner skin of a seat ring turns into a very small clearance, a fluid serves as rapid flow from this clearance, and the conventional butterfly valve flows into secondary. The rapid flow of this fluid by the side of an orifice acts a suction force on the inner skin of a seat ring, attracts a seat ring in the bore direction, and a seat ring will be damaged or it will tear it off from a valve body. Since the seat ring of this invention is most enlarged as the width of face (L) and the include angle (θ) of a slant face of the valve-stem rectangular cross location where a suction force acts on this orifice side strongly most were mentioned above The clearance between the valve element heads and seat ring inner skin in a very small opening becomes large enough, as shown in drawing 3, the amount of the seat ring attracted by the method of inside can be decreased as much as possible, and it becomes possible to prevent the exfoliation phenomenon from breakage and the valve body of a seat ring.

Drawing 2 showed the case where the width of face and the include angle of a slant face did not have still sufficient magnitude, and in this case, since the amount of attraction of a seat ring was almost changeless with the thing of drawing 1, it was able to prevent neither breakage nor exfoliation effectively. In addition, in drawing 1, and 2 and 3, the dotted line expresses the magnitude of attraction of a seat ring.

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EXAMPLE

[Example] The desirable example of this invention is explained with reference to drawing 4 -10. With reference to drawing 4 and 5, (1) is the valve body of a butterfly valve, it consists of rigid ingredients, such as a metal and hard synthetic resin, and the cylindrical shape-like fluid channel (2) is installed through the interior. In a fluid channel (2), a disc-like valve element (3) makes it agree with a valve stem and a rotation core, and is supported to revolve free [rotation]. (4) is a seat ring which consists of spring materials with which the inner skin of a fluid channel (2) is equipped, such as rubber and synthetic resin, attaches and detaches the peripheral face of a valve element (3), and opens and closes a fluid channel (2). With reference to drawing 6, conventionally like the well-known seat ring, the sheet section (5) of Yamagata which projected in the bore direction surrounds inner skin in the center of inner skin of a seat ring (4), and is formed in it. In the location which intersects perpendicularly with the valve boss (6) which penetrates a seat ring (4) in the diameter direction, the width of face is formed most greatly, width of face decreases gradually according to ***** to a valve boss (6), and this Yamagata sheet section (5) is the smallest in the location contiguous to the periphery edge of the boss section (7) of a valve boss. The seat ring (4) of a graphic display is the thing of a high voltage fluid service, and the band-like metal back up plate (8) is embedded inside. A slant face (11) is formed between the inner skin (9) of a seat ring (4), and a periphery side face (10).

[0016] Although the slant face (11) is formed in the both-sides side of a seat ring (4) In the location (C-C' cross-section location) where, as for the slant face (11) located in the upstream of a valve as shown in drawing 7 -10, a valve stem, and the width of face (L) and include angle (theta) cross at right angles It is formed in the maximum width of face (L2) and the maximum include angle (theta 2), and is formed in the minimum width of face (L1) and the minimum include angle (theta 1) in the valve boss location (A-A' cross-section location). In the intermediate location (B-B' cross-section location), it is formed in the same width of face (L1) and the same include angle (theta 1) as a valve boss location, and it continues by the smooth curve (12) between C-C'B-B from cross-section location' cross-section locations, and it is continuing in a straight line mostly up to the B-B'A-A from location' location. The width of face and the include angle of a slant face which are located in secondary are formed in all those parts identically to the minimum width of face (L1) of the A-A' cross-section location of an upstream slant face, and an include angle (theta 1). A curve (12) may not be limited to a radii line and may be a curve like a cosine curve.

[0017] The continuation between the C-C'A-A which has minimum width-of-face and minimum include angle from cross-section location' cross-section locations which have the maximum width of face and the maximum include angle of a slant face (11) is not restricted to continuation by the smooth curve (12) shown in drawing 7, as shown in drawing 11, it may continue by the step (13), and as shown in drawing 12, it may continue in a straight line (14). Although considering as a B-B' cross-section location is desirable as shown in drawing 11 when continuing by the step (13), it is not limited to this. Moreover, you may make it change like [not only the upstream but the secondary width of face (L) and the secondary include angle (theta) of a slant face (11)] the upstream, as shown in drawing 14 and 15. Thus, as shown in drawing 5, when putting and attaching a butterfly valve between the flanges (16) of a piping pipe (15) by changing the width of face and the include angle of a slant face of both sides, it becomes useful the selfish difference in right and left being lost to a valve, and preventing a construction mistake.

[0018] The seat ring (4) of not being restricted to the structure of a high voltage fluid service mentioned above is natural, and can completely be similarly applied to the seat ring (40) of the structure currently used abundantly at the comparatively low-pressure fluid shown in drawing 16 -18. That is, the seat ring for low voltage (40) consists of only elastomers fundamentally, the embedding of the metal plate for reinforcement does not have it, and its structure where the flange (41) inserted into the periphery side face of a valve body was formed is the most common on both sides. In such a seat ring, the above mentioned width of face and the above mentioned include angle of a slant face are completely applicable similarly. Moreover, the inner skin of a seat ring of not being restricted to the thing equipped with the Yamagata sheet section of a graphic display may be natural, and may be inner skin which has the seat ring which has flat inner skin or other configurations, and structure. Furthermore, the construction material of a seat ring is not restricted to elastomers, such as rubber and synthetic resin, but can be applied also like the seat ring which consists of very little resin of elasticity like polytetrafluoroethylene.

[Translation done.]

* NOTICES *

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3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] The explanatory view showing the attraction condition of the seat ring by the side of the orifice of the conventional butterfly valve

[Drawing 2] The explanatory view showing the attraction condition of the seat ring equipped with the slant face which has inadequate width of face and an inadequate include angle

[Drawing 3] The explanatory view showing the attraction condition of the seat ring equipped with the slant face concerning this invention

[Drawing 4] The perspective view which carried out the cross section of a part of butterfly valve incorporating the seat ring concerning this invention

[Drawing 5] The sectional view showing the condition of having constructed the butterfly valve equipped with the seat ring concerning this invention on the piping line

[Drawing 6] The perspective view which carried out the cross section of a part of seat ring concerning this invention

[Drawing 7] The development view of the seat ring concerning this invention

[Drawing 8] The sectional view which met the drawing 7 A-A' line

[Drawing 9] The sectional view which met the drawing 7 B-B' line

[Drawing 10] The sectional view which met the drawing 7 C-C' line

[Drawing 11] The development view of the complete-change form of the seat ring concerning this invention

[Drawing 12] The development view of other complete-change forms

[Drawing 13] Furthermore, the development view of deformation of others

[Drawing 14] The sectional view which met the drawing 13 B-B' line

[Drawing 15] The sectional view which met the drawing 13 C-C' line

[Drawing 16] Furthermore, drawing which carried out the cross section of the seat ring of deformation of others in the drawing 7 A-A' line position

[Drawing 17] Drawing which carried out the cross section in the *** drawing 7 B-B' line position

[Drawing 18] Drawing which carried out the cross section in the *** drawing 7 C-C' line position

[Description of Notations]

(1) Valve body

(2) Fluid channel

(3) Valve element

(4) Seat ring

(5) Yamagata sheet section

(6) Valve boss

(7) Boss section

(8) Metal back up plate

(9) Inner skin

(10) Periphery side face

(11) Slant face

(12) Curve

(13) Step

(14) Straight line

(40) Seat ring

(41) Flange

(L) Width of face of a slant face

(theta) The include angle of a slant face

[Translation done.]

* NOTICES *

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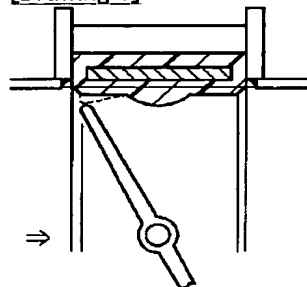
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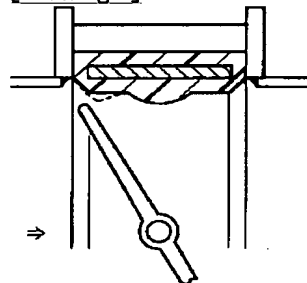
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DRAWINGS

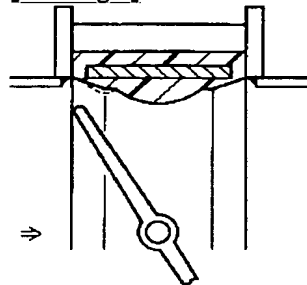
[Drawing 1]



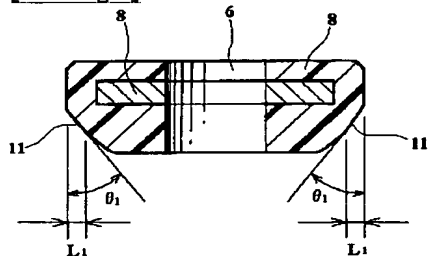
[Drawing 2]



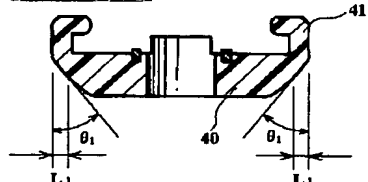
[Drawing 3]



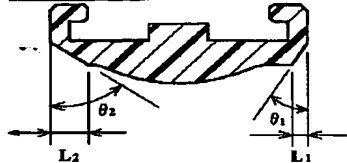
[Drawing 8]



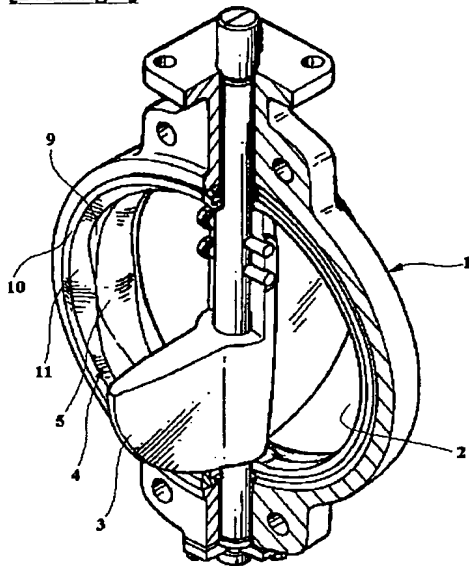
[Drawing 16]



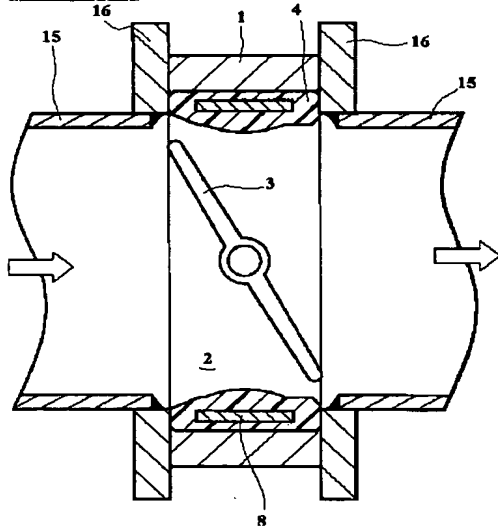
[Drawing 18]



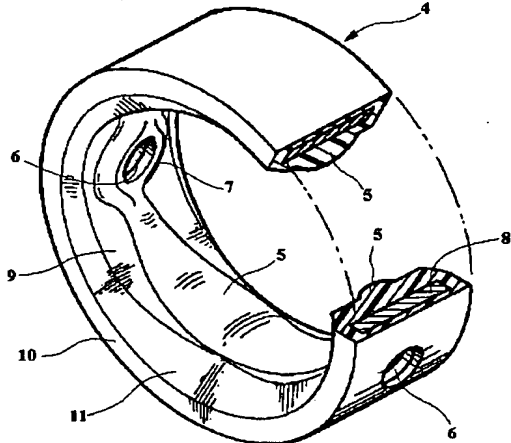
[Drawing 4]



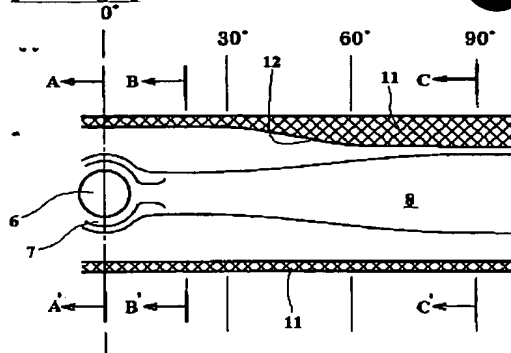
[Drawing 5]



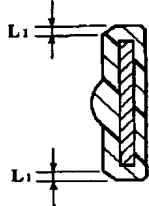
[Drawing 6]



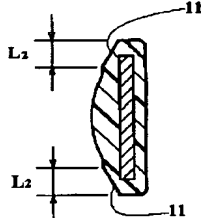
[Drawing 7]



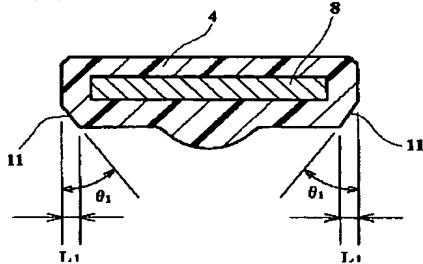
[Drawing 14]



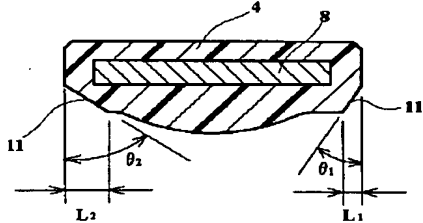
[Drawing 15]



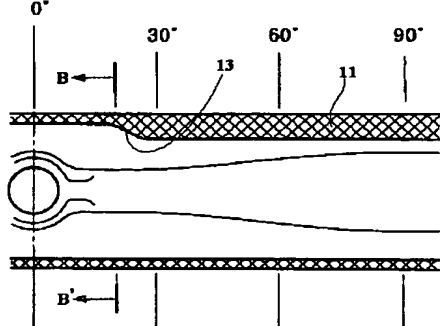
[Drawing 9]



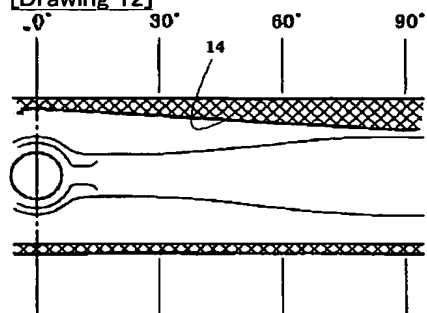
[Drawing 10]



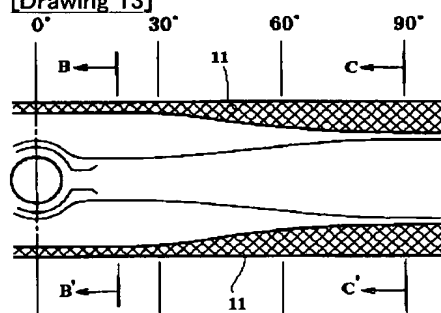
[Drawing 11]



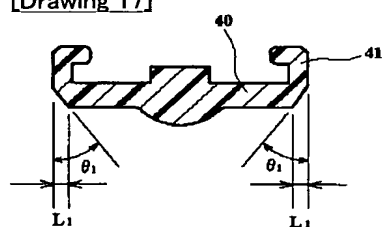
[Drawing 12]



[Drawing 13]



[Drawing 17]



[Translation done.]